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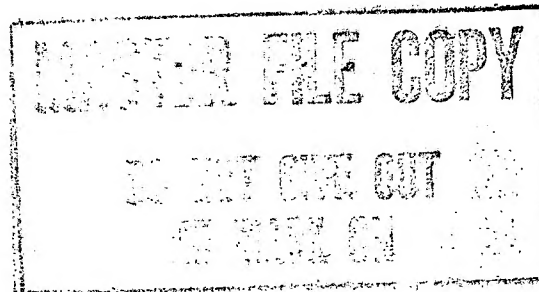
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# **USSR: Economic Projections Through 1990—A New Look**

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**A Research Paper**



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February 1984

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# USSR: Economic Projections Through 1990—A New Look

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A Research Paper

This paper was prepared by [redacted] of the  
Econometric Analysis Division, Office of Soviet  
Analysis, with contributions from [redacted]  
[redacted] of the same division. [redacted]

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**Preface**

Projections of Soviet economic development provide an essential backdrop for discussions of Soviet policy options and their implications for the United States. The annual research papers in this series are designed for analysts of Soviet economic, political, and military trends and are intended to give them a quantitative outlook for the Soviet economy that incorporates as much as we can say about specific factors influencing growth prospects—highlighting areas of uncertainty. A study of alternative projections enables us to distinguish between those uncertainties that significantly cloud our view of future growth (that is, those in areas where change will have a major impact) and those whose impact on growth is likely to be small. [REDACTED]

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In this annual paper we link recent developments—new analyses of particular Soviet economic issues, published during the year, and events affecting the economy—to overall Soviet growth prospects. For example:

- In 1983 the Directorate of Intelligence (DI) published a major study of the outlook for Soviet energy production through the 1980s; its growth implications are examined in this projections paper.
- The Directorate also published a new estimate of Soviet defense spending. The implications of future defense spending growth—either at rates of the recent past or after possible shifts in defense spending policies—for growth in general and for the Soviet consumer in particular are examined in this paper.
- Leadership changes during the past year and the increasing focus on the need to improve economic performance could affect productivity; and we have used the quantitative framework of this paper to bound the impact that productivity gains could have on economic performance during this decade. [REDACTED]

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[REDACTED] Given its focus on an attempt to quantify the major influences on Soviet growth prospects, this paper omits much of the information of a qualitative nature that is dealt with in those publications. Such information is particularly important to analysts who are considering the likelihood of future events in order to develop a single best estimate of the Soviet economic future. The objective of the annual projections paper is more modest—to develop a reference picture of the future and to bound some of the major uncertainties that affect it. [REDACTED]

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**Key Judgments**

*Information available  
as of 15 December 1983  
was used in this report.*

In 1981 and 1982—the first two years of the 11th Five-Year Plan (1981-85)—growth in Soviet gross national product (GNP) was 2.1 percent and 2.6 percent per year, respectively. In 1983 it was 3 to 3.5 percent, according to our estimates. This improvement probably owes much to the effect of favorable weather on sectors such as agriculture and transportation and something to the effect of gains from the regime's efforts to enforce labor discipline. Despite that improvement, however, our projections—under the assumptions set forth herein—indicate that Soviet economic growth will average only 2 percent per year for the decade.

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This paper presents a set of conditional projections of the growth prospects for the Soviet economy through 1990. Using a large-scale econometric model, we combined a structural description of the economy with assumptions about likely trends in the 1980s to develop a baseline projection or reference outlook. We then adopted other assumptions—possible, though perhaps less likely, developments in important economic factors—and used these in the model to project the bounds within which future economic growth is likely to fall. Taken together, the baseline and alternative projections provide a preliminary, quantitative picture of the prospects for the economy through the rest of the decade, as a point of departure for discussion and further analysis.

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On the basis of these projections, we expect that:

- The average annual GNP growth rate will be roughly 2 percent in the 1980s. (It was 5 percent in the 1960s and 3 percent in the 1970s.)
- Industrial output, which accounts for a little more than one-third of the national product, will grow at slightly more than 2 percent per year over the decade.
- Agriculture will be the most volatile sector of the economy, as always. We make projections based on known trends in agricultural production and an assumption of average weather conditions, but the changeability of specific weather from year to year will cause actual agricultural output to vary rather widely around any projected trend.
- Per capita consumption will remain at a low level during the decade, allowing at best only modest improvements in average living standards.

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- Energy supplies will constrain economic growth little through the middle of the decade. In the later years, they could be a modest drag on growth if energy exports are held close to present levels and energy demand continues on the trend we expect.
- Foreign trade will not help the Soviet economy in the 1980s as it did in the 1970s, when fast-rising prices for energy and gold and the rapid growth of arms sales enabled the Soviets to increase real hard currency imports at a rapid rate. During the rest of this decade, real hard currency exports are projected to grow about 1 percent a year.

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This general growth outlook could change with changes in various economic factors. The model's response to our alternative assumptions indicates that:

- A shift in defense spending policy would have only a small impact on overall growth during the decade, because the industrial plant in the Soviet Union is very large relative to the amount of resources involved in shifts of this kind. A shift in defense spending policy, however, has considerable impact on both consumption and investment in the near term, and changes in investment could have important implications for growth in the early 1990s.
- Only one of our alternative assumptions would open the possibility of significant improvement in growth prospects by 1990—a return to more favorable productivity levels of the late 1960s and early 1970s. The comprehensive organizational reforms needed to achieve such a dramatic turnaround in the USSR are not likely to be in place soon.

Our results suggest that, without a fundamental reform of the economic system or a combination of very favorable circumstances bringing back pre-1975 productivity relationships, the Soviets probably can do little to alter the economic growth trend through 1990 as it is indicated in our baseline. They will, however, have some opportunity to change the distribution of output to competing claimants—investment, defense, and the consumer—in pursuit of policy goals.

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The chief obstacles to substantial improvement in Soviet economic performance are problems built into the economic system itself. Nevertheless, the period of continued low level of growth that we project through 1990 should not be taken as a harbinger of economic collapse. Growth will be sufficient to support a wide range of policy initiatives, especially in the areas of defense and investment, and still keep the living standard of the traditionally hard-pressed Soviet consumer from declining. It would be more accurate to interpret our projections as depicting a difficult and stressful period for a large and viable, if inefficient, economy.

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**Introduction**

We continue to project a difficult time for the Soviet economy through the 1980s. Energy problems may pose less of a threat to growth this decade than we thought earlier, but demographic factors are certain to hold down labor force growth, and partial depletion of the raw material base in the developed European regions will increasingly force expensive new investments in remote areas of Siberia. Furthermore, improvements in labor productivity will be hindered by the continued slow growth of capital investment, and hard currency trade is not likely to offer a solution to the industrial materials and investment problems that are already emerging. Superimposed on these trends is the sharpening competition for resources between the civilian and military sectors of the economy.

Leadership changes in the USSR have increased the uncertainty in our economic forecasts in general and in our forecasts of the distribution of national output among major claimants in particular. Decisions to be made in 1984 and 1985 will have important implications for the pursuit of policy goals related to defense, investment, and consumption during the 12th Five-Year Plan (1986-90)—the timespan that occupies a large part of the period of our forecasts. While overall growth in the 1980s may not itself be shifted much by choices here, the impacts on military spending or on the consumer could be substantial.

The projections shown in this paper were developed using a large-scale econometric model.<sup>1</sup> The model enables us to integrate individual assumptions and analytic judgments so that a consistent set of general quantitative trends can be deduced. The assumptions and judgments that underlie the baseline projections

are of two general types: where we have developed supporting analyses, the input represents our current view of likely developments in the Soviet economy during the rest of the 1980s; and, where the future is particularly ambiguous, we use an extrapolation of the recent past as a point of departure, and then consider alternative assumptions (see inset). For the most part, our projections are based on historical data updated through 1981 or 1982 and on statistical parameters estimated over a period ending a year or two before that.

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The baseline projections, therefore, represent a Soviet growth scenario that differs from other scenarios only in the values that are given to the model. We have developed some alternative scenarios by deliberately changing the inputs from their baseline values to reflect alternative Soviet policies or external events and have also analyzed the projected trends that result from these changes. The purpose of these projections is to provide a sense of the range within which future Soviet growth is likely to fall and to assess some major factors influencing that range. In this sense, the baseline should be viewed as a point of departure and should not be construed as a formal "best estimate" of the outlook for the Soviet economy.

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The baseline assumptions and projections follow, in two parts: one presents text with a graphical summary, and the other displays selected estimates in tabular form.<sup>2</sup> Given the nature of the assumptions postulated in this paper, we have much more confidence in the general trends of the projections than in estimates for particular years. The annual figures, however, can be used to illustrate where the economy might be in a given year in the absence of major changes in political and economic conditions.

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A number of improvements in the model have been made since 1979, but its essential structure has not changed. This model was constructed primarily to make medium- to long-term projections. Its estimates for the short term, while very near the trend, are not generally as accurate as those available from alternative methods.

<sup>2</sup> Throughout this report, components may not add to the totals shown because of rounding.

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**Uncertainties in the Projections**

*The growth rate of Soviet GNP during the 1980s is the "bottom line" of the economic projections presented in this paper. The projections of this growth rate are developed through a process in which our model calculates GNP values on the basis of a number of input variables, which represent many kinds of data from a variety of sources. The process requires that a value for each variable be put into the model for each year of the period over which the GNP projections are to be made. Whenever previous analysis has provided estimates of likely trends in some of these input variables, we have adopted those estimates; in other cases, we have developed independent estimates; and in economic areas where the future is particularly ambiguous, we have simply examined alternative assumptions.*

*There are differing degrees in the certainty that can be attached to these input data values. Our estimates of labor force growth are relatively firm, for example, because all the people who will start working during this decade can already be identified in existing population data and we have good information on mortality rates. At the other end of the certainty spectrum is the distribution of GNP among primary uses—consumption, investment, and defense. This distribution is subject to the policy choices of Soviet leaders, and the values for the allocations to defense spending and investment that we must develop and put into the model are analytic assumptions on our part, which may be subject to substantial revision as events unfold. For example, we assume certain*

*growth rates for defense expenditures and for military hardware procurement through the 1980s on the basis of our analysis of observable current and historical trends. The actual growth rates of these variables in the future, however, can be influenced by decisions of the leadership in ways that the size of the labor force in the 1980s (to a large extent already determined by demographic factors) can not.*

*Most input data fall between those extremes, and the degree of certainty frequently depends on the amount of research that can successfully be applied to the subject. Confidence in our energy production forecast is buttressed by a major research effort in that area, for example, and continuing research indicates substantial evidence of a long-run decline in productivity growth in the Soviet economy. On the other hand, no one would claim that the future price of gold—a factor in our calculation of the Soviet trade balance—can be forecast with confidence.*

*In general, we have more certainty about input values that are subject to little, if any, manipulation through policy or are clearly reflections of long-term trends that are not likely to be reversed quickly. Certainty is less about the assumed values of input variables that can be strongly influenced by such factors as policy decisions and market prices. One reason for looking at alternative GNP projections is to gauge how sensitive the values generated by the modeling process are to some of the more important uncertainties in the input variables.*

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Later in the text, appropriate sections discuss hypothetical shifts in our baseline assumptions about the future Soviet economic environment and policy decisions and the impact of these shifts on the baseline solution. Three of these scenarios deal with the prospects for agriculture, trade, and productivity. Two reflect alternative degrees of Soviet success in meeting energy requirements. And two involve alternative sets of assumptions reflecting fundamentally different policy decisions as to the priorities to be accorded defense and consumer welfare. The illustrations that accompany the discussion summarize some major aspects of the data in the appendix.

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**Baseline Assumptions**

The projections presented in this report are based on a number of key assumptions about future trends in the Soviet economic environment. We have chosen these to represent (1) what we think will be likely developments in the 1980s or (2) a continuation of present or historical trends, where data are too ambiguous to

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support a judgment about the most likely outcome. Our baseline assumptions include the following:

- The average productivity of the Soviet capital stock, which has fallen substantially since 1975, will continue to fall, since a given amount of investment will provide a smaller growth increment than in the past.
- The labor force will grow more slowly in the 1980s than it did in the 1970s—at an average annual rate of 0.7 percent, down from 1.5 percent.
- The allocation of investment and labor among producing sectors will reflect the trends evident in the Soviet Five-Year Plan for 1981-85. The shares going to the energy sectors will increase (at the expense of some consumer sectors). The shares accorded to heavy industry will remain relatively constant through 1990.
- Oil production (currently 12.4 million barrels per day) will nearly reach the plan target of 12.6 million b/d in 1985, then begin a slow decline to 11.5 million b/d in 1990.<sup>3</sup> On the other hand, gas production will continue to increase rapidly, more than offsetting the drop in oil output.
- The energy efficiency of newly installed plant and equipment will continue to improve. By coupling these gains with our projections of capital stock, we can estimate total Soviet energy requirements.
- With continued growth of domestic energy requirements, the Soviets will face a conflict between maintaining oil exports and meeting domestic needs. We assume that (while making a significant reduction in oil exports) they will absorb most of the energy shortfall domestically, thus slowing the rate of growth of the economy.

- The Soviets cannot count on foreign trade to provide a way out of their difficulties. The oil and gas markets are likely to be soft for most of the decade, arms sales will face increased competition from other suppliers, production problems and growing domestic demand will hold back increases in exports of most nonfuel minerals, and low quality and poor marketing techniques will continue to retard increases in exports of machinery and other manufactured goods.<sup>4</sup>
- Fundamental economic reform will not be part of the Politburo agenda. We assume that there will be no shift in political or economic policy having a significant impact on economic performance. 25X1

The issue of future Soviet defense spending deserves special attention. Our latest estimate of recent defense spending concluded that real growth in total outlays for the period 1976-81 averaged about 2 percent annually, rather than the 4 percent it had averaged earlier.<sup>5</sup> During the same period, there was little real growth in procurement of military hardware. 25X1

Because the causes of the slowdown in military procurement growth are not fully understood, we cannot state confidently (1) whether the growth trend will rebound quickly or (2) whether the procurement slowdown will retard the increase in overall defense expenditures for some time. To develop a baseline projection of Soviet growth to 1990, we have assumed that the slower growth in total defense expenditures will continue unchanged through 1990—but that, within the total, military procurement growth will rise 25X1

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slightly and research, development, testing, and evaluation (RDT&E) growth will fall slightly after 1985. Since the issue of future defense growth involves considerable uncertainty at this point, we examine in a later section the impact on Soviet growth prospects of alternative defense spending assumptions. [redacted]

### Aspects of Soviet Economic Growth Under Baseline Assumptions

#### Sources of GNP

Our baseline projection of roughly 2-percent average annual GNP growth in the 1980s indicates that Soviet economic growth will remain at recent low levels for the balance of the decade. Soviet GNP grew at a rate of 2.1 percent per year in 1981 and 2.6 percent in 1982. The stronger economic showing in 1983 (which returned GNP growth to an estimated 3 to 3.5 percent for that year) was due primarily to favorable weather and does not foreshadow a higher rate of growth through the rest of the 1980s.<sup>6</sup> Low average growth will persist through the 1980s, in spite of the improved outlook for oil production and the reduced growth in expenditures for military procurement that we assume in this year's forecast.<sup>7</sup> [redacted]

These changes in our assumptions improve growth only marginally, because the additional resources released for productive use represent only a small percentage gain for the economy as a whole. The average GNP growth rate of about 2 percent that we project for the 1980s contrasts with 5 percent in the 1960s and 3 percent in the 1970s. [redacted]

*Industrial output*, which constitutes about 35 percent of the national product, is likely to grow during the rest of this decade at a little above 2 percent—a rate about one-third that of the late 1960s and less than

[redacted]  
[redacted]  
[redacted] Our projection of 2-percent GNP growth over the decade is based on the assumption that energy constraints will cause economic growth to be about half a percentage point less in the second half of the decade than it would be without energy shortages. [redacted]

<sup>7</sup> See page 18 for a comparison of our 1982 and 1983 baseline projections. [redacted]

half that of the 1970s. Industry faces the economywide problems of slower growth of plant and equipment, labor, and other inputs. The industrial heartland of European Russia also faces a rapid depletion of raw materials production capacity. More and more investment resources that might otherwise contribute additional industrial output are being used simply to maintain existing production levels, as new raw material and energy deposits are developed in the remote and high-cost areas of Siberia. Even if the share of annual investment in the oil sector were to double between now and 1990, a decline in oil production over the last half of the decade cannot be prevented.<sup>8</sup> [redacted]

*Farm production* is highly dependent on weather conditions. We estimate future crop yields on the basis of the historical trends, incorporating changing weather trends. The return to trend-line agricultural growth after the bad harvest years of 1980 and 1981 results in estimates of short-term agricultural growth that are deceptively high, the return to normal having the appearance of "growth." Nevertheless, ignoring year-to-year fluctuations, Soviet agricultural output is likely to grow at the trend rate over the rest of the 1980s. [redacted]

#### Uses of GNP

The projections of aggregate and sectoral economic growth are influenced by many interrelated factors. The projected distribution of GNP among end uses (figure 2) is particularly sensitive to the assumptions we have made about annual investment allocation shares and the trend in defense expenditures over the decade. After calculating GNP as the output of the producing sectors in the economy, we estimate consumption as the residual claimant on GNP after investment and defense requirements have been met. This method is useful because it reflects the historical order of priorities in the Soviet command economy; but it means that our projection of consumption will be directly affected by errors in our defense and investment assumptions. [redacted]

The declining growth in production over the 1980s noted above in the section on sources of GNP means

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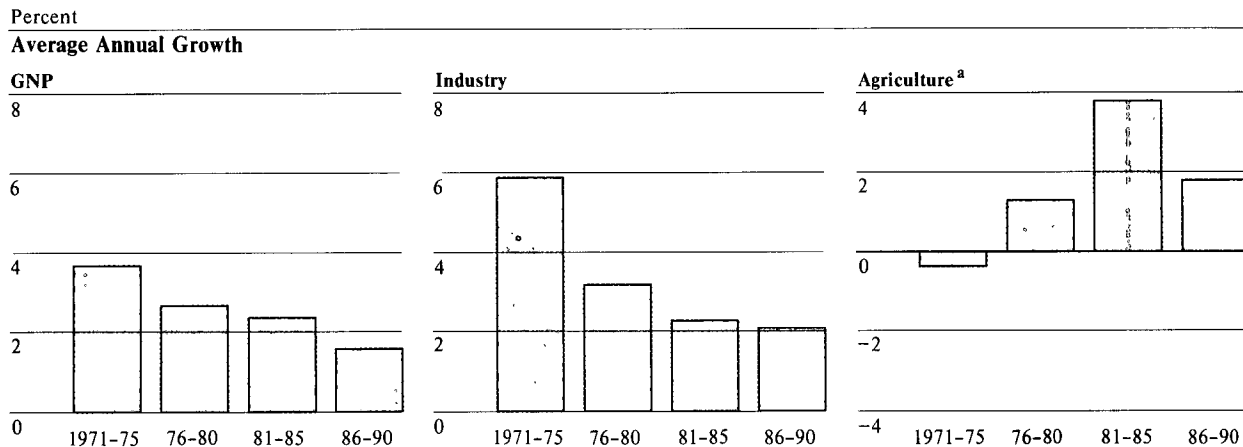
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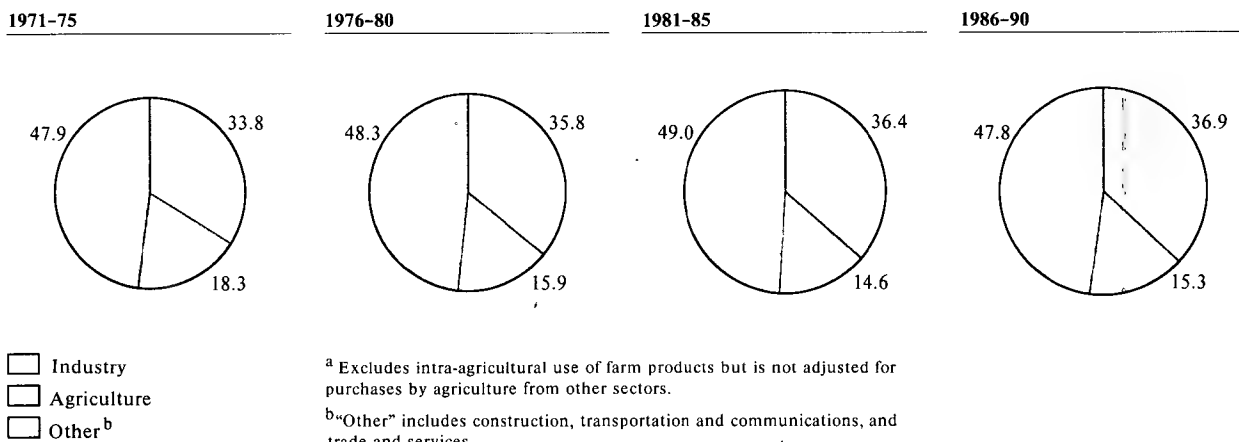
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**Figure 1**  
**Sources of GNP**



**Production Shares**



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slower expansion in the availability of goods and services to be divided among the competing claimants—resources for future growth (investment), the consumer, and defense. Our projections in 1983, as in 1982, indicate that for the rest of the decade Soviet economic planners will continue to face the dilemma of how best to distribute very small increments to national output. At the end of 1983, however, some of our GNP distribution assumptions differed signifi-

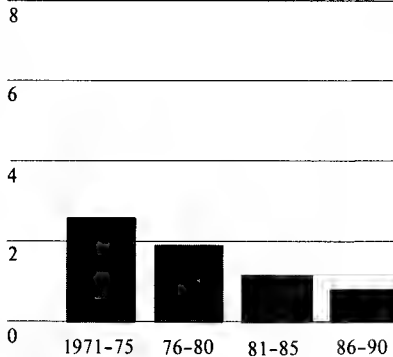
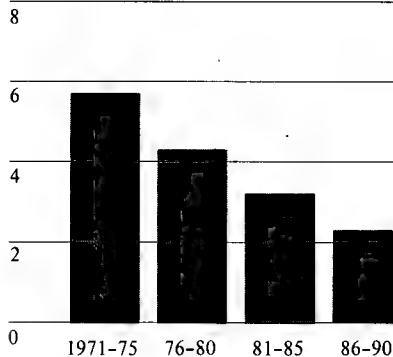
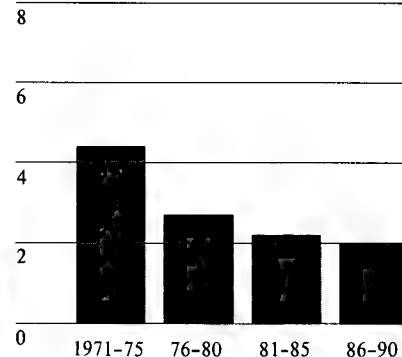
cantly from those of 1982. In brief, we now assume that the Soviets will give defense a continuing rather than a rising priority; this is reflected in the proportion of GNP we project as being allocated to defense. The difference between our findings in 1982 and 1983 is discussed in the section on GNP distribution (page 18).

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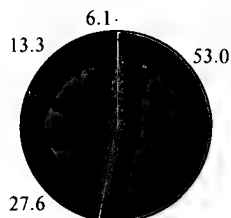
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**Confidential****Figure 2**  
**Uses of GNP**

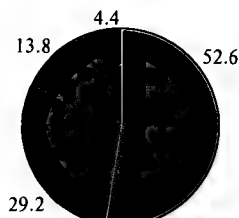
Percent

**Average Annual Growth****Per Capita Consumption****Total Investment<sup>a</sup>****Defense<sup>b</sup>****End-Use Shares**

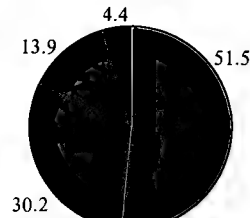
1971-75



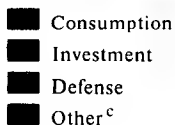
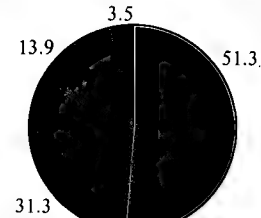
1976-80



1981-85



1986-90



<sup>a</sup> Total investment consists of repairs to the capital stock, net additions to livestock herds, and new fixed investment for expansion of Soviet production capacity.

<sup>b</sup> Defense expenditures are an input to the model (not a projection); they are assumed to grow at the 1976-81 average annual rate of 2 percent per year from 1982 through 1990.

<sup>c</sup> "Other" includes expenditures for government administration, civilian R&D, net exports, and inventory change.

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**Key Resources**

The Soviet economy has followed a path of "extensive" rather than "intensive" growth. Growth has been largely driven by a rapid expansion of the labor force and the stock of plant and equipment rather than, as in the industrial West, by productivity increases.

The increase in the labor force in the 1980s will be less than half of what it was in the 1970s (figure 3). The labor force—up by 20 million during 1971-80—is expected to increase by roughly 9.5 million in 1981-90.

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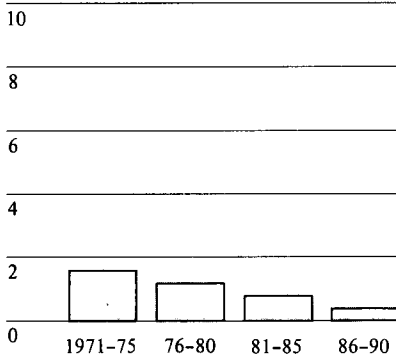
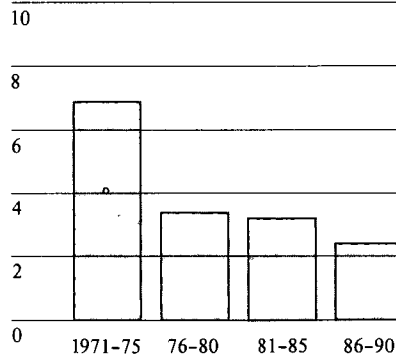
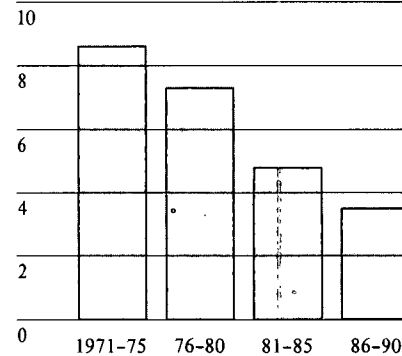
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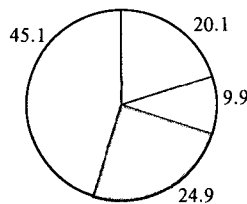
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**Figure 3**  
**Key Resources**

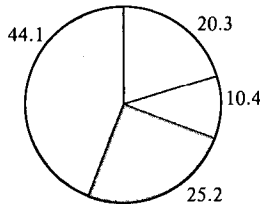
Percent

**Average Annual Growth****Labor****New Fixed Investment****Capital Stock<sup>a</sup>****Investment Shares**

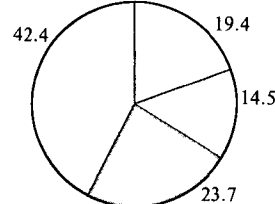
1971-75



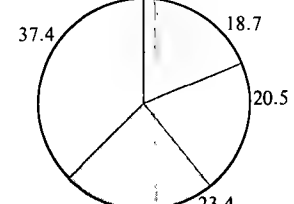
1976-80



1981-85



1986-90



- ☐ Agriculture
- ☐ Energy industry
- ☐ Other industry
- ☐ Other<sup>b</sup>

<sup>a</sup> Does not include housing. The estimates for 1981-85 and 1986-90 reflect adjustments for reduced use because of a possible energy deficit.

<sup>b</sup> "Other" includes construction, transportation and communications, trade and services, and housing.

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Our projections indicate that new fixed investment in the 1980s will increase at less than half the rate of the 1970s, primarily because of slower growth in machinery production and new construction starts. However, our current estimate of the growth rate of new fixed investment for the 1980s, about 2.5 percent annually, is greater than last year's projection. This is mainly because we assume that the total value of durable goods going to the defense sector will not increase during the period up through 1985.

The impact of the generally reduced expansion of investment in the 1980s on GNP growth will be compounded in particular by the increasing demand for investment goods per unit of output in the energy sectors. Just to sustain a low rate of growth in energy output, the Soviets will have to give energy a greatly increasing share of investment. This will depress the expansion of investment in the nonenergy sectors.

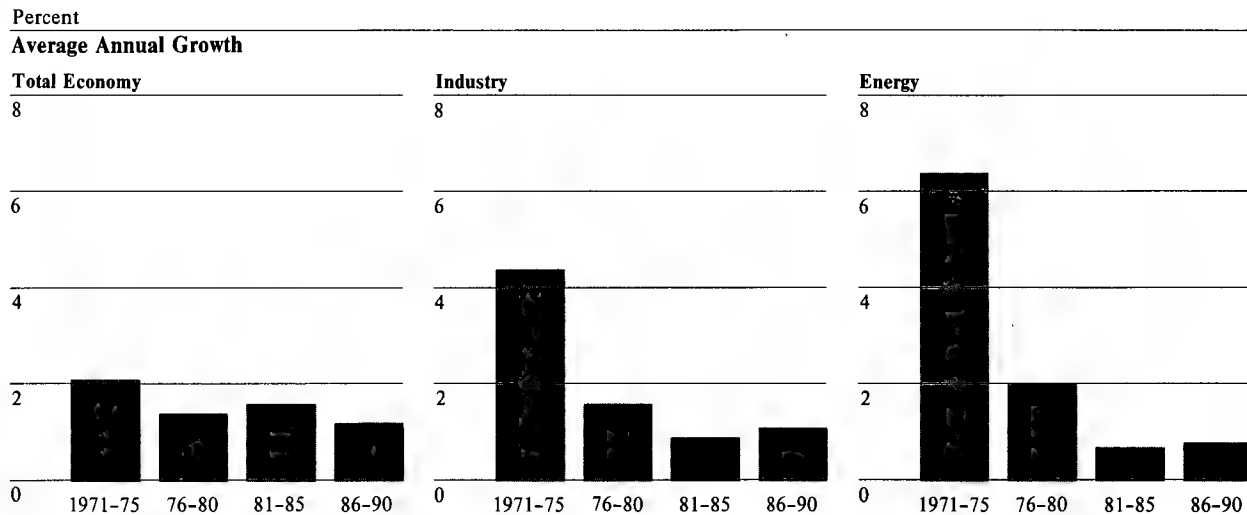
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**Figure 4**  
**Labor Productivity**



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Over the decade, according to our results, a significant energy deficit could develop in the domestic economy. We assume that adjustments in this situation would include retirement of the most inefficient energy-using equipment and somewhat lower rates of capital use.

#### **Labor Productivity**

The key to Soviet labor productivity improvement in the past has been increases in capital per worker. Now, however, unless Soviet planners achieve more success in realizing technological innovations, improvements in organization, and other sources of productivity increases, any additional increases in capital per worker will have less and less effect on productivity.

Since the mid-1970s, the returns on additional capital have been diminishing more rapidly than in earlier years. The reasons for this include (1) raw material shortages, (2) greater costs associated with the shift in the locations of raw material supplies from the depleted areas west of the Urals to Siberia, (3) probably transportation bottlenecks, and (4) possibly worsening worker morale.

In spite of the publicity given domestically and abroad to Andropov's labor discipline campaign, we have as yet insufficient data to measure an intermediate to long-term positive effect on productivity. It is even possible that the influence of those factors that led to a decline in the effect of extra capital on output in the late 1970s may intensify in the future.<sup>9</sup> If that is the case, our low labor productivity growth estimates shown here are conservative, and the actual growth will be even smaller.

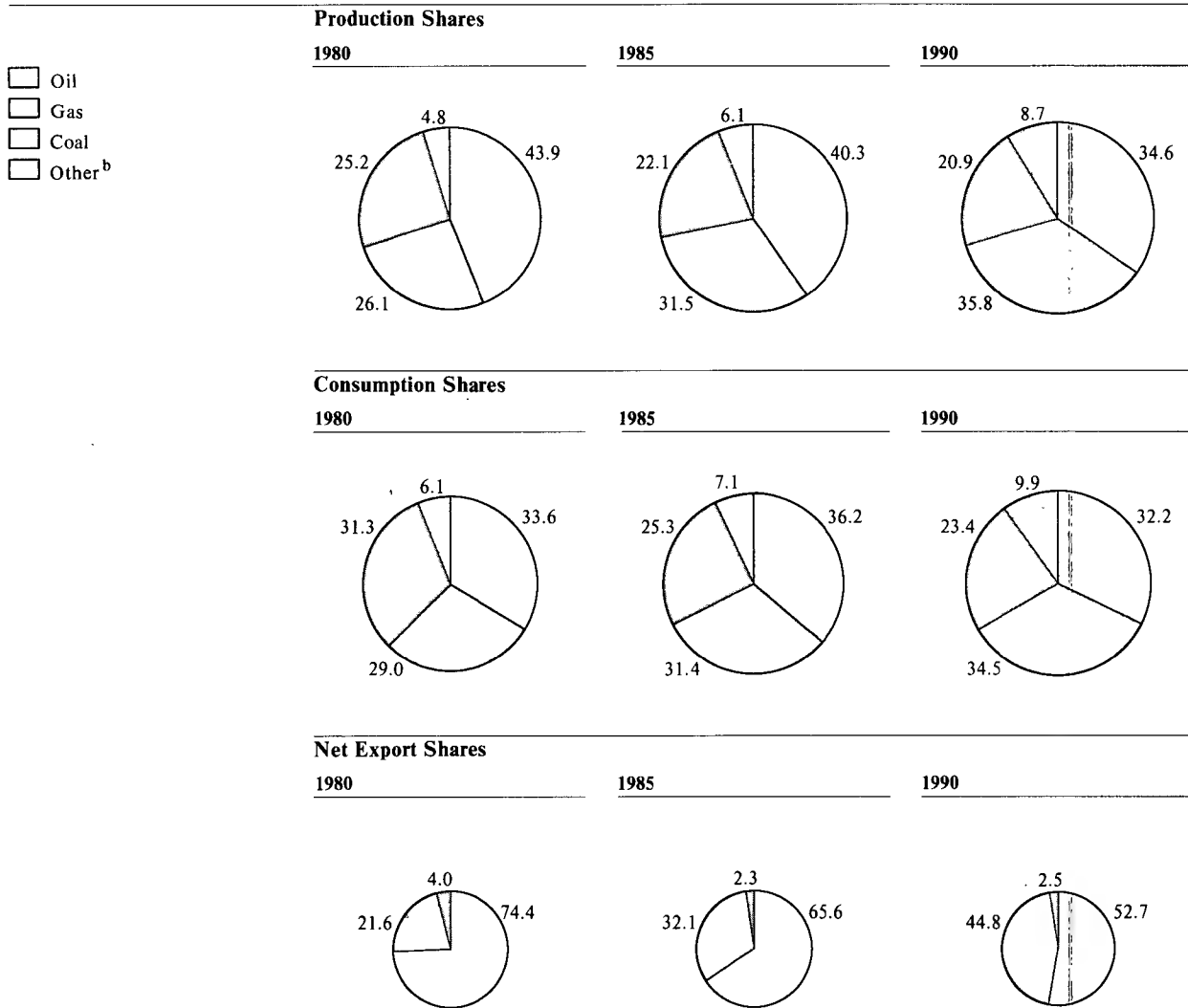
The pattern of productivity growth in our 1983 projections is only marginally different from those of 1982. The differences are not significant in terms of trend. They are due to some shifts in 1983 in our assumptions about Soviet investment allocations and to improved prospects for production in some energy sectors, particularly oil.

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**Figure 5**  
**Energy Balance Trends<sup>a</sup>**

Percent



<sup>a</sup> The overall size of the circles suggests the relative importance of production, consumption, and net export of energy.

<sup>b</sup> "Other" includes hydroelectric and nuclear power, as well as shale and other minor fuels.

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### Energy Balance Trends

Estimated Soviet production and export of energy are key inputs to our model, and the difference between them can be taken as the estimated amount available

for domestic consumption. In addition, the model allows us to develop an independent estimate of Soviet domestic energy requirements based on a projection of

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Soviet plant and equipment. It is the relationship between this need for energy and the amount actually available for consumption that affects projected GNP growth: the closer the amount of energy available for consumption comes to meeting requirements, the closer is GNP growth to the potential defined by labor force and capital stock trends. In our modeling, if energy available for domestic consumption is not sufficient to meet requirements, growth will not reach this potential because some capital stock, lacking energy, will be idle. [ ]

We estimate that primary energy production will grow by about 1.7 percent per year on average for the rest of the decade, down from 4.6 percent in the 1970s. Expected gains in gas production will be somewhat offset by declining oil production and continued stagnation of coal output. For the USSR to maintain a positive energy balance, the planners must hold domestic energy consumption growth to a little below 2 percent a year if critical exports to Eastern Europe and exports to the West for hard currency are to be met. (c)

At the same time, our projections indicate that domestic requirements for primary energy—which are largely determined by the size, age, and composition of the capital stock—will continue to rise at an average of about 2.7 percent annually. [ ]

The implication of these trends is that the economy may be operating under an energy constraint—with domestic energy requirements greater than the energy available for consumption—especially as the end of the decade approaches. At the macroeconomic level of our analysis, the impact of an energy constraint is to prevent full use of available capital. This leads to reduced output and has the effect of making our baseline projection of annual GNP growth almost half a percentage point lower in the last half of the decade than it would be otherwise.<sup>10</sup> Our modeling, however, can only roughly account for the effects of a possible energy imbalance. [ ]

Moreover, we do not yet have clear indications of Soviet policy concerning energy investment, production, consumption, and trade during 1986-90. The Soviets' success in avoiding energy imbalances will to a large extent be determined by their ability to implement an intricate combination of energy production policies, which are likely to be costly in terms of other economic objectives, and energy conservation policies, which will face serious obstacles in the rigidity of Soviet economic management. [ ]

Adding to the complexity of this issue, the mix of energy output will also shift during the decade, as shown in figure 5. If the economy is to adapt to the new mix of energy produced, energy-consuming sectors will have to make significant adjustments. For example:

- The chief area of gas-for-oil substitution is electric power generation. Yet the Soviet refining industry, which currently produces vast quantities of fuel oil, is not equipped to process into lighter products the large amounts of excess fuel oil that would be made available through gas substitution.
- Gas-for-oil substitution also requires substantial construction of feeder pipelines and, in some cases, adaptation of capital equipment. The Soviets have made some progress in these areas, but the outlook is unclear. [ ]

Of the two problems, the inadequate refining mix is the more serious. Although the Soviets have long been aware of the need to shift the refinery output mix to emphasize lighter products, they have yet to introduce sufficient cracking units. For example, they planned to build nine cracking units in the 1981-85 period, but by late 1983 they had reported only two under construction. Any rapid development of this sector would probably require Western assistance. [ ]

Energy exports are expected to decline slightly, with 1990 energy exports about 5 percent below the 1982 level. The relative importance of oil and gas exports will shift, with the expected decline in oil exports. Increased gas exports will take up some, but not all, of

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the slack. Despite these changes, energy will still remain the dominant Soviet hard currency earner. [ ]

**Oil Production Trends.** The Soviets' current oil output of about 12.4 million b/d accounts for roughly 40 percent of their total primary energy production. Three-fourths of this oil is used domestically and one-fourth exported. Roughly half of the exported oil goes to the Council for Mutual Economic Assistance (CEMA) countries, and about one-third goes to the West for hard currency. [ ]

We estimate that Soviet oil production will begin to decline after the mid-1980s. This is based on the increasing requirements for drilling and fluid lift and on the lagging infrastructure development in West Siberia. The severity of the decline will depend on Soviet willingness to increase investment rapidly. We use a working assumption that production will rise slightly to 12.5 million b/d by 1985, and then decline to 11.5 million b/d in 1990. [ ]

**Gas Production Trends.** Current gas production of roughly 8.7 million barrels per day oil equivalent (b/doe) accounts for nearly 30 percent of total primary energy production. About 11 percent of the gas is exported. We estimate that gas output will rise substantially in this decade. The annual growth rate will average almost 5 percent through 1990, and nearly 80 percent of the increase will be used to meet rising domestic energy requirements. Lagging gas-for-oil substitution could slow the increase in gas demand, and hence production could be lower than these projections. We estimate that by 1990 gas will account for about 35 percent of total primary energy production. [ ]

**Coal Production Trends.** Coal production, currently some 6.6 million b/doe, represents about 22 percent of total Soviet primary energy output. Net coal exports account for less than 2 percent of the coal mined. We anticipate that coal production and exports will remain near current levels throughout the decade, but rising output will be accompanied by a degradation in the energy content of the coal. [ ]

#### Hard Currency Trade

Foreign trade is not expected to boost the Soviet economy in the 1980s as it did in the 1970s. At that

time, fast-rising energy and gold prices and the rapid growth of arms sales enabled the Soviets to increase real hard currency imports at an average rate of more than 20 percent a year. Through the 1980s, prices are likely to be far more stable and the volume of exports is likely to rise more slowly. [ ] 25X1

The real value of both fuel and nonfuel exports is assumed to grow at about 1 percent a year over the rest of the decade.<sup>11</sup> Fuels, therefore, will continue to account for about two-thirds of export earnings, with the real price of energy assumed to remain roughly constant. The earnings mix, however, is expected to change, with: 25X1

- Earnings from oil sales declining about 45 percent in constant dollars.
- Earnings from gas sales rising by 180 percent in real terms, making gas the most important Soviet hard currency export.

We estimate that real exports of other commodities will grow very little and that earnings from gold and arms sales will remain stagnant in real terms. [ ] 25X1

Real import growth will depend on the need to buy grain and other farm products and on policies and opportunities regarding the purchase of foreign machinery, high-technology equipment, steel, and other investment goods. Assuming rising domestic grain production, unchanged meat production policies, and a continuation of low real grain prices in the world market, we project that the real value of annual grain imports will remain well below the 1981-82 level for the rest of the decade, although grain imports may reach 30 million tons a year by 1990. The Soviets will probably need to import more investment goods, however, because of their growing desire to raise industrial productivity, even though machinery imports from the West can have, at best, only a modest impact on overall growth. [ ] 25X1

Because real hard currency earnings are likely to grow slowly, if at all, during the rest of the decade, real growth of imports would require increased use of foreign credits and a growing hard currency debt. It 25X1

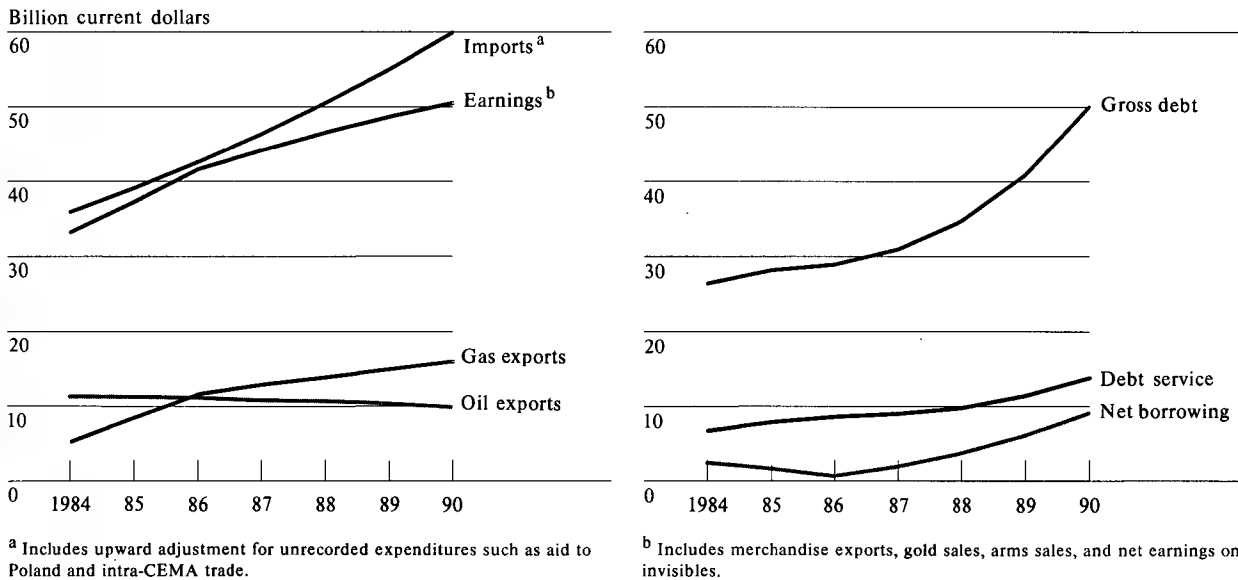
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**Figure 6**  
**Hard Currency Trade**



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may well be difficult for Soviet leaders to accept these conditions. Hence, import growth in real terms over the next seven years will probably be well below the average rate of the 1970s. Even a modest goal of 2 percent a year real growth for all hard currency imports—a figure we used in our baseline projections—would cause the trade deficit to grow 40 percent in constant dollars by 1990. Real credit drawings could remain fairly constant over the next several years but would escalate quickly toward the end of the decade to nearly twice their current level. Over the same time period, the real hard currency debt would increase by one-third. The debt service ratio, however, would remain roughly the same for most of the decade and would still be only about 25 percent in 1990.

This situation could be strongly affected by Soviet grain output and by the world energy situation. A string of poor harvests, necessitating larger grain imports than we here envisage, could add billions of dollars a year to Soviet hard currency needs or force the redirection of imports from other commodities to

grain. Any increase in imports would have to be met through additional borrowing (causing foreign debt to rise even more) or at the expense of critical investment good imports (retarding even more the sluggish growth of the Soviet economy). On the other hand, an upturn in energy prices and demand—say, because of an expansion of the Middle East conflict—could drastically increase revenues from fuel exports. This could eliminate the need for most of the projected hard currency credit drawings, thus causing foreign debt to decline sharply by 1990. Or the Soviets could use the increased revenues to raise imports of needed investment goods, thus fostering industrial and energy growth.

#### Variations on the Baseline Growth Case

##### Energy Availability

Overall Soviet economic growth may have suffered from the slower growth in energy production that

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began in the late 1970s. Since 1976, frequent reports have told of power outages and fuel shortages. As a result, output of cement, chemicals, food, and other commodities has been impeded. Energy quotas have been extensively imposed on industrial ministries and factories to cope with electric power shortages.<sup>12</sup>

Moreover, [ ] power shortages in the late 1970s cost an average of 1.7 billion rubles annually in damaged equipment and disrupted processes. We expect this problem to worsen in the 1980s and beyond. [ ]

To minimize these shortages, the USSR will give priority to energy investment. It has grown faster than overall Soviet investment since 1979, and this trend will continue through the decade. In the 1981-85 period, the Soviets plan to increase energy investment by 50 percent, boosting its share of all new industrial investment to more than one-third. (Overall investment is slated to grow by roughly 10 percent.) [ ]

The Soviets are facing increasingly difficult investment choices. The rising cost of this investment will strain the economy by "crowding out" investment in other key sectors. The energy industry already consumes 65 percent of Soviet pipe production, more than 15 percent of machinery output, and substantial shares of other sector production. As energy production costs increase, the investment burden of rising energy production will grow over time. [ ]

[ ] a 2- or 3-percentage-point increase in energy's share of investment could lower overall economic growth by 0.1 to 0.15 percentage point and the consuming sector's share by 0.3 to 0.4 percentage point. On the other hand, it will be difficult to slow the pace of energy investment, given the growth of energy demand by other productive sectors. [ ]

Given the impact of rising energy costs in the 1980s and the potential impact of energy shortfalls, the Soviets may emphasize conservation and energy efficiency, especially later in the decade. If effectively implemented, such a policy could minimize shortfalls. Results could be achieved more quickly if the government gave a high priority to energy conservation and [ ]

consequently were willing to sacrifice other economic objectives. We estimate that progress in energy conservation will be slow. The Soviets know the potential benefits of using more energy-efficient equipment and structures, but they have trouble realizing this potential. Energy efficiency is only one (and by no means the most important) of the many goals set for Soviet machinery producers and builders. Managers incorporate design improvements slowly, so as not to risk failure to meet production targets. [ ]

Moreover, equipment continues to be used as long as it can be repaired. The average annual retirement rate of Soviet capital stock has been about 1.5 percent, less than half that of normal Western practice; and, in contrast to Western experience, no major Soviet industry has modernized its entire establishment with new, more energy-efficient equipment. If the government were willing to push it, a more rapid retirement of outmoded equipment would reduce energy requirements more rapidly—but at a cost of slower economic growth in the short-to-intermediate term. [ ]

We have examined two additional scenarios (figure 7), which differ from the baseline case in our forecasts for oil, gas, and coal production and our estimates of the investment necessary to achieve those output levels. For this study, we set production and investment for the oil, gas, and coal sectors at other "reasonable" levels—below and above our baseline estimates. For example, we assumed that oil production by 1990 would be 11 million b/d in the low-energy scenario and 12 million b/d in the high-energy scenario, instead of the 11.5 million b/d used in our baseline case. Based on our assessment of Soviet energy demand in the 1980s, both scenarios assume that most of the adjustment in energy availability is made in the export sector. Therefore, the impact on the domestic economy is rather small in either case. [ ]

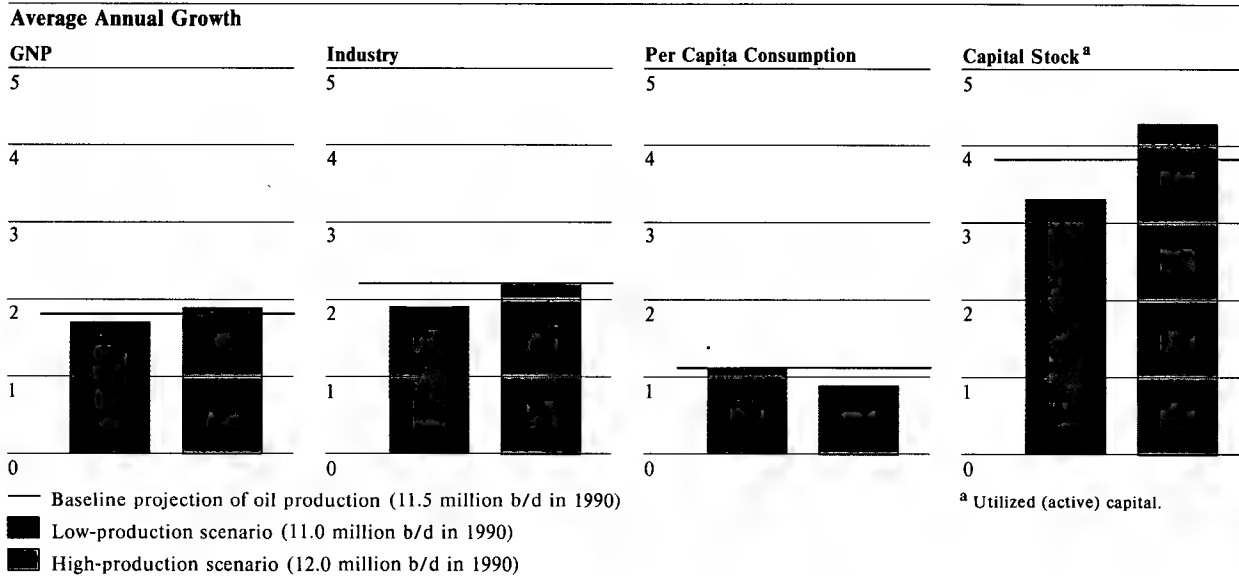
By 1990, total GNP is 6 billion rubles (or about 1 percent) higher in the high-energy case than in the low-energy case, industrial investment is 12.4 percent higher, and the industrial growth rate is four-tenths of a percentage point higher. As noted above, most of the impact will be felt in the export sector, where the [ ]

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**Figure 7**  
**Energy Scenarios, 1984-90**  
 Effect of Low and High Energy Production  
 on Selected Economic Aggregates  
 Percent



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additional energy exports (principally oil) associated with the high-energy scenario would boost export earnings in 1990 by more than \$5 billion over the earnings in the low-energy scenario (that is, from \$8.3 billion to \$13.5 billion).

If the Soviets could improve energy efficiency sufficiently to remove the energy constraint, then growth prospects would improve. The GNP growth rate, for example, would be about 2 percent in the 1986-90 period, up from 1.6 percent in the baseline case.

We assume that Soviet economic planners will squeeze the consumption sector hard in order to allocate sufficient investment to energy. By 1986-90, even in the low-energy scenario, the annual growth rate of per capita consumption is reduced to less than 1 percent, down from an average of 2.3 percent in the 1970s. Given the slowdown in economic growth, the Soviets will be hard pressed to maintain consumption's share of GNP.

#### Other Factors Influencing Economic Growth

**Agriculture.** Conditions and actions taken in the agricultural sector strongly affect year-to-year growth figures for the Soviet economy. In recent years, bad weather in the main grain-growing areas has caused output to run well below trend levels.<sup>13</sup> Our baseline projection of Soviet agriculture assumes a return to more normal weather conditions for the rest of the decade. Continuing unfavorable conditions could keep grain output below these trend expectations, while favorable weather during the rest of the 1980s would cause it to outrun them.

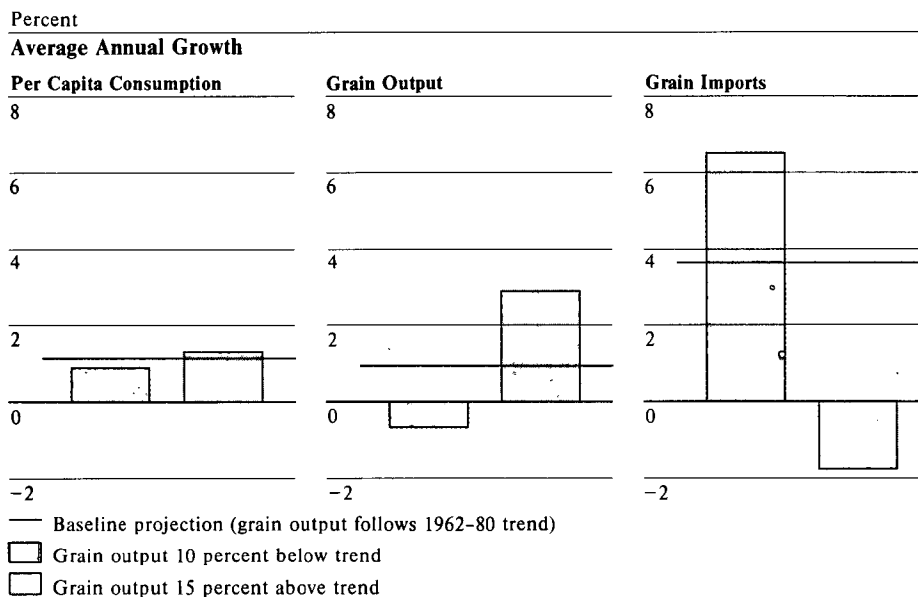
The implications of these possibilities were explored in two scenarios (figure 8). One assumes grain output to be 10 percent below trend levels for the rest of the

<sup>13</sup> The trends we assume are based on Soviet grain output from 1962 to 1980. See *Soviet Economy in the 1980s: Problems and Prospects* (Washington: GPO, 1983), part 2, p. 118.

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**Figure 8**  
**Agriculture Scenarios, 1984-90**  
 Effect of Low and High Assumptions  
 About Grain Production



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decade (as could be the case in the event of less favorable weather) and the other 15 percent above (which could result from more favorable weather). We believe these scenarios are plausible because grain production averaged 9 percent below trend levels from 1979 through 1982 and 16 percent above from 1976 through 1978. Historically, each percentage point of deviation of grain output from trend levels is associated with a change in total Soviet agriculture output of 0.4 percentage point in the same direction. Our analysis shows that almost all of this impact is passed along to Soviet consumers.

In the short run, rates of growth of agricultural output and consumption, as well as labor and capital productivities in the agricultural and consumer goods sectors, can be greatly affected by shifts in weather conditions. In the long run, these rates are more affected by other factors underlying agricultural production—such as capital formation, technical change, and institutional developments.

If the weather were favorable, the grain output in 1990 would be 30 million tons greater than the trend level for that year. This would be enough to meet almost all Soviet needs (unless Soviet planners chose to expand the nation's grain reserves). Under these circumstances, grain import requirements would be well below the levels indicated by our baseline conditions. Actual imports, however, could still be high, because of long-term grain agreements. Existing agreements obligate the USSR to purchase at least 20 million tons a year until the second half of the decade.

If the weather were unfavorable, Soviet grain output would be more than 20 million tons below the trend level in 1990. This would require substantial imports but the increase would be constrained by the grain-handling capabilities of Soviet ports and by policy considerations. Additional grain imports could in-

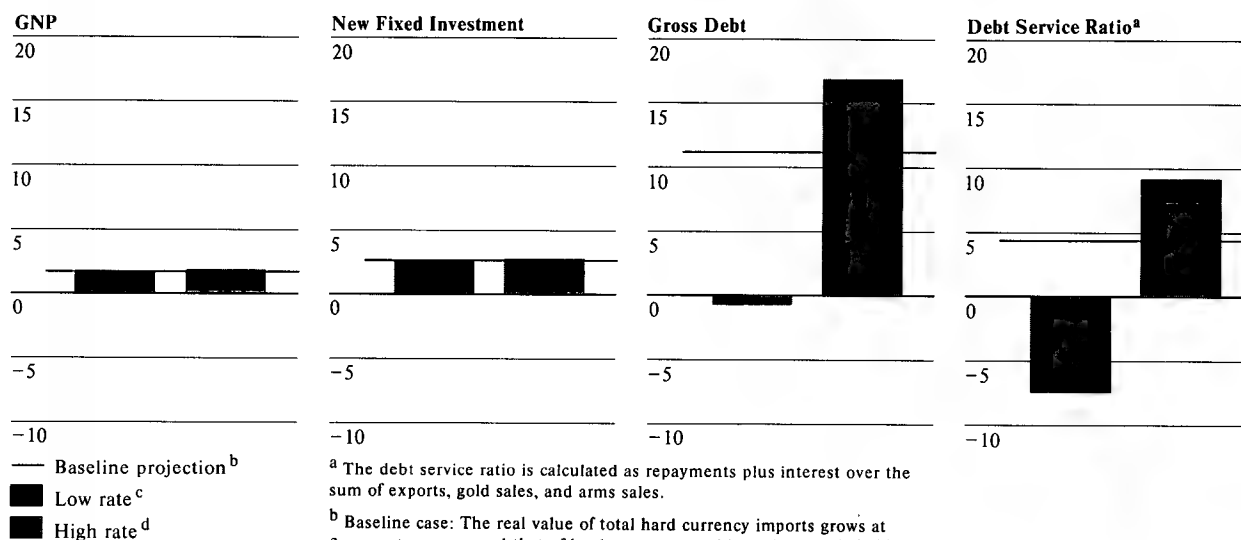
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**Figure 9**  
**Trade Scenarios, 1984-90**  
 Effect of Low and High Machinery Import Levels  
 on Selected Economic Aggregates

Percent

Average Annual Growth



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crease hard currency credit drawings, accelerating the growth of debt to Western countries. The Soviets could decide, however, to offset some of the cost of grain imports by reducing imports of other commodities; under similar conditions in 1981, they chose to reduce imports of machinery from hard currency countries.

**Trade.** If unfavorable grain-growing conditions required a long-lasting reduction of hard currency imports, could that reduction harm Soviet industrial investment and accelerate the decline in Soviet productivity and economic growth? Two scenarios explore this question (figure 9). In the first, the real value of hard currency machinery imports is assumed to return to the low 1981 level and remain there for the rest of the decade. In the second, the real value of total hard currency imports is assumed to grow at a

rate of 3 percent a year (50 percent faster than in the baseline projection), the additional imports being accounted for by purchases of machinery. We assume in both scenarios that the shift in machinery imports is not offset by changes in the levels of other types of imports and thus comes to affect hard currency credit drawings and debt.

Our model suggests that these shifts would have only a small impact on total investment, consumption, and economic growth. This is because, in aggregate terms, hard currency machinery imports are relatively small. In the early 1980s they were only one-third of the level of machinery imports from Communist countries, some 7 percent of the total output of the Soviet

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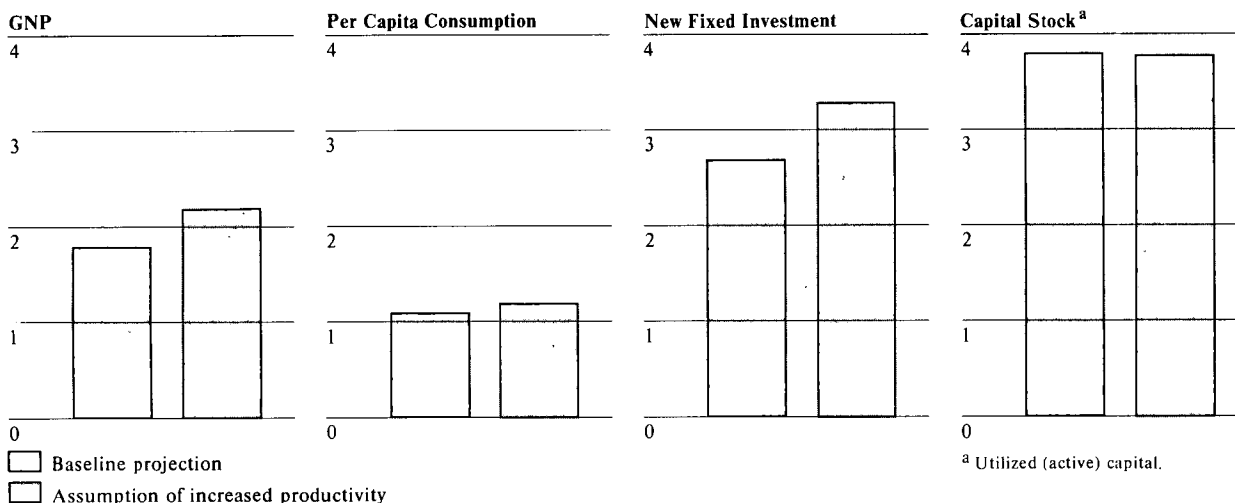
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**Figure 10**  
**Production Scenarios, 1984-90**  
 Effect of Increased Productivity  
 on Selected Economic Aggregates  
 Percent

## Average Annual Growth



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machine-building and metalworking sector, and only about 3 percent of the level of total investment. One should keep in mind, however, that hard currency machinery imports do have a special value for the Soviets; they are willing to use their scarce hard currency and increase their hard currency debt to obtain them. These imports may be critical in a number of key areas, such as energy production, where their effect on the Soviet economy may well be greater than our model results indicate.<sup>14</sup>

Our analysis suggests that changes in hard currency machinery imports could have a significant impact on the Soviet hard currency payments position. In the scenario with lower import growth, the 1990 trade deficit is 20 percent below the deficit in our baseline

<sup>14</sup> The valuation of hard currency imports is a controversial issue. The results from our model—which does not distinguish (in quality or productivity terms) between hard currency machinery imports, Communist country machinery imports, and machinery produced in the USSR—may understate the value of hard currency machinery imports to the Soviets. Nevertheless, we judge that the model's valuation of these imports relative to the larger economic aggregates is near the mark.

projection, debt service payments and the debt service ratio are more than 50 percent lower, and net borrowing is two-thirds lower. The gross debt is one-third lower. In the scenario with greater imports of hard currency machinery, the trade deficit is more than 25 percent higher, debt service payments one-third greater, and net borrowing two-thirds more than in the baseline case. In 1990 the gross debt is more than \$70 billion and the debt service ratio is 36 percent. Soviet leaders probably would avoid this second scenario unless they were driven to it by a critical need for specific key import items.

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**Productivity.** Past Soviet efforts to boost output focused on increasing inputs of capital and labor. For a number of reasons, the difficulty of continuing this approach has grown substantially. Emphasis now appears to be focused on:

- Improving the productivity of labor, initially through greater discipline of the work force and eventually through better training.

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- Increasing the efficiency of capital investments, with special attention to the completion of projects already under way and better maintenance of the existing capital stock.

This emphasis creates its own problems. Even if it can be made to work, would it have an appreciable impact on the growth of the Soviet economy?

Putting aside the question of feasibility—the cost involved, the implications for other sectors, or the speed with which it could be effected—we have examined the implications of improved productivity by assuming the Soviet economy to operate in the 1980s as it did before 1975. (Econometric analysis of the various sectors of the industrial economy reveals that the impact of additional investment on labor productivity dropped after 1975.) A return to pre-1975 productivity growth trends would help the Soviet economy grow faster by increasing the gain in labor productivity derived from increases in the stock of machinery and equipment.

If the Soviet industrial economy were operating as it did before 1975, industrial output would be growing at almost twice its actual rate. This growth would slow down considerably in the last half of the decade but would still remain well above the growth we now project for that period. As a result, 1990 machinery output would be 10 to 15 percent higher, total investment almost 10 percent greater, and consumption about 7 percent more than is now projected. The economy's total stock of capital would grow faster under these conditions than in the baseline case, although our results suggest that an energy shortfall could retard the growth rate of capital stock actually used in production.

To approach the growth rates of our improved productivity scenario within the next five to seven years, the Soviets would almost certainly have to make very ambitious and incisive reforms across a wide spectrum of policy areas—including investment, labor, trade, and economic management—on a scale that we consider unlikely for the Soviet bureaucracy.

## Distribution of GNP

### Comparison of 1982 and 1983 Projections

The 2-percent average annual growth of GNP over the 1980s in our 1983 projections is not significantly different from the growth rate that we projected in 1982, although it reflects new defense assumptions and our current judgments that oil production will not begin to decline until after 1985 and will fall less far by 1990. The difference in GNP distribution is more noticeable. Our assumption of 2-percent average annual growth in defense expenditures (versus 4 percent last year) and slower growth in military hardware procurement has the effect of releasing resources for other uses. Investment and consumption in the 12th Five-Year Plan period both benefit, and per capita consumption no longer shows the absolute decline reflected in the 1982 projections.

The impact of the decreased drag on investment has only a gradual positive effect on output growth in the 1980s. Nevertheless, production capacity is increased somewhat because growth in the *stock* of plant and equipment will eventually follow growth in the *flow* of investment goods. Increases in investment and production capacity in the 1980s could position the economy better for improved growth in the 1990s. The implications of less stringency for the consumer, in the form of continuing (though modest) improvements in average living standards, would be a boon for the Soviet leadership. Gains could include a positive effect on labor productivity, as more goods and services continue to be available in exchange for wages earned.

The growth rate for defense expenditures that we currently assume is approximately the same as our projected growth rate for the economy as a whole. Therefore, in our current baseline scenario the defense burden remains at about 14 percent throughout the decade instead of increasing (as it did in our 1982 calculations) to 15 percent in 1985 and 17 percent in 1990.

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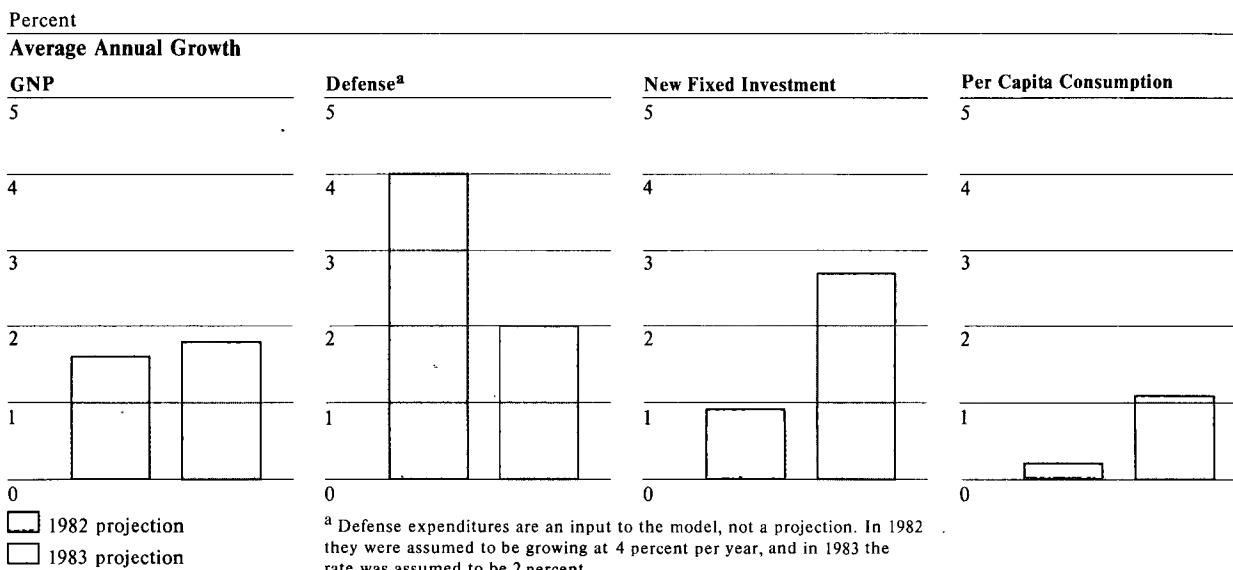
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**Figure 11**  
**Comparison of 1982 and 1983 Baseline Projections,**  
**1984-90**



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### Scenarios Favoring the Consumer or the Military

The estimate of Soviet economic prospects presented in our baseline depends in part on a number of key judgments about the future Soviet economic environment and policy decisions. We have also examined two cases (figure 12) in which we assume Soviet leaders decide to distribute the economy's growth increment in a manner different from that assumed in our baseline case. In one we postulate a consumer welfare, in the other a military, orientation. Neither policy option alters our baseline forecast of GNP growth by as much as one-fourth of a percentage point per year during the decade, but the outcomes for the claimants on national output are significantly different. The results are in accord with our observation that, leaving aside consideration of fundamental economic reform, Soviet policy choices are more likely to affect the distribution of national output than to affect its growth during this decade.

**Consumer Welfare Orientation.** We assume that the aim of a welfare-oriented policy in the USSR would be to move the economy onto a higher growth path by providing the material incentives needed to spur productivity. Our assumptions for this case include increased shares of investment for housing, light industries, and agriculture—sectors that produce goods for which there is much unsatisfied demand—and for energy. For this scenario, we assume that defense spending remains flat, to allow for increased total investment, and that the volume of food and other consumer goods imported from the West is increased.

As a result, GNP growth is slightly lower than in the baseline case during the last half of the decade, because of the shift of resources away from the sectors

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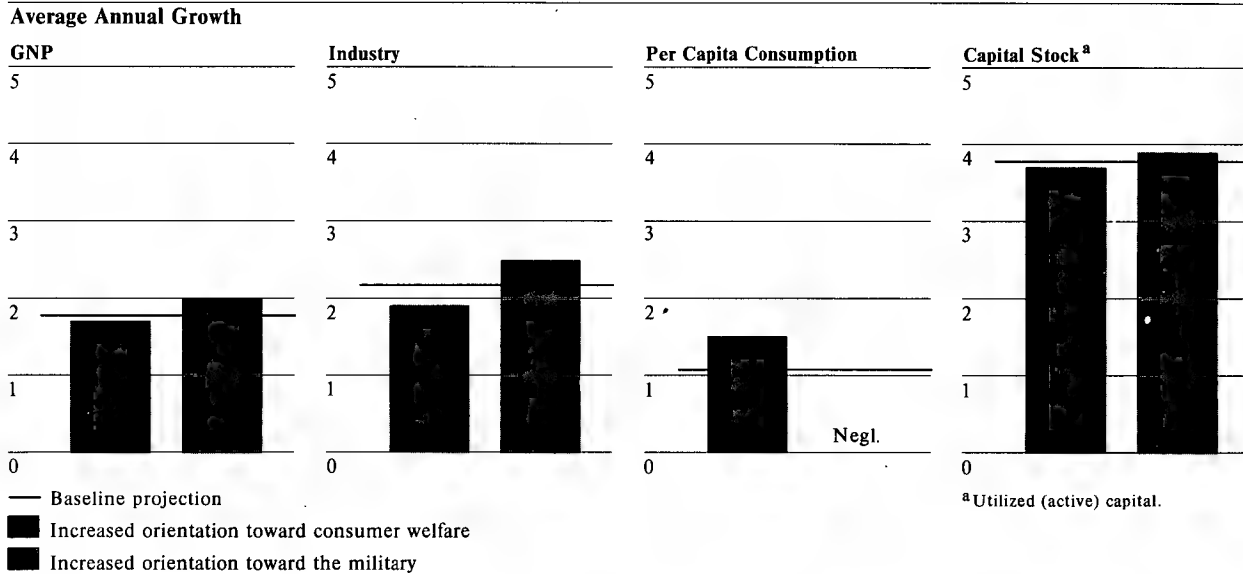
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**Figure 12**  
**Alternative Allocation Scenarios, 1984-90**  
 Effect of Increasing the Priority of the Military  
 or of Consumer Welfare  
 Percent



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that produce investment goods—machinery and construction. There are substantial gains for the consumer, however. Per capita consumption growth is maintained at the 1970s level through the middle of the decade and is twice as great through 1990 as the growth in our baseline case.

**Military Orientation.** If the Soviet leaders felt that the challenge by the West to the nation's security interests required a stronger response, they might accelerate the buildup of their military forces and choose economic policies with a military orientation. To increase military production in the long term, they would step up investment in energy, industrial materials, and the investment goods sectors. For this scenario, we assume defense spending would grow at 5 percent per year—a rate slightly higher than the historical rate of the 1966-76 period. More repressive domestic measures would be likely, and we assume a mandatory return to a longer workweek, which increases the labor input to the economy. We also assume that a defense spending growth rate of about 1 percent per year above the historical level would not acutely alarm Western nations. Therefore, the Soviets could increase their machinery imports from the West to meet the greater need for investment goods and

their sales of oil to the West for the hard currency necessary to pay for the machinery. Oil sales to Eastern Europe would be reduced.

An accelerated arms buildup would be costly. GNP growth would increase slightly over that in the baseline case, primarily as a result of the extra investment (and subsequent production) in the energy and defense industries. But the defense burden would escalate, forcing down the per capita consumption growth rate by nearly half a percentage point a year on the average during the latter half of the decade. Despite a somewhat higher overall rate of investment, important civilian sectors (especially consumption goods and services) would suffer, as an increasing share of new plant and equipment went to defense industries. Furthermore, the combination of higher take-home pay (which we postulate as resulting from a longer workweek) and fewer consumer goods could increase the repressed inflation in the USSR and lead to popular discontent. Under this scenario, the share of GNP going to defense would reach 18 percent by 1990, a figure about one-third higher than the average defense burden during the Soviet military buildup of 1966-76.

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## Appendix

Selected Tables From the  
Baseline Projections**Table 1**  
**Selected Key Assumptions**

	1984	1985	1986	1987	1988	1989	1990
Population ( <i>million persons</i> )	274.6	276.8	278.8	280.7	282.7	284.6	286.6
Total defense ( <i>billion 1970 rubles</i> )	79.7	81.3	82.9	84.6	86.3	88.0	89.8
Machinery procurement ( <i>billion 1970 rubles</i> )	21.1	21.1	21.5	21.9	22.3	22.8	23.3
Manpower ( <i>million persons</i> )	5.8	5.8	5.8	5.8	5.9	5.9	5.9
Oil production ( <i>million barrels per day</i> )	12.4	12.5	12.3	12.0	11.8	11.7	11.5
Hard currency oil exports ( <i>million b/d</i> )	1.0	0.9	0.9	0.8	0.7	0.7	0.6
Oil exports to Communist countries ( <i>million b/d</i> )	1.9	1.9	1.8	1.8	1.7	1.6	1.5
Gas production ( <i>billion cubic meters</i> )	556.6	590.0	614.0	638.9	664.9	691.9	720.0
Hard currency gas exports ( <i>billion cm</i> )	30.7	42.1	53.9	55.9	56.3	56.7	56.7
Gas exports to Communist countries ( <i>billion cm</i> )	41.0	45.0	50.0	54.0	54.0	54.0	54.0
Coal production ( <i>million metric tons</i> )	719.2	720.0	724.9	729.9	734.9	739.9	745.0
Nonenergy hard currency exports ( <i>billion US \$</i> )	8.1	8.7	9.5	10.2	11.0	12.0	12.9
Gold sales ( <i>billion US \$</i> )	4.2	4.4	4.9	5.2	5.5	5.9	6.3
Sales volume ( <i>tons</i> )	312.4	306.5	312.9	310.9	308.1	310.1	309.8
Gold price ( <i>US \$ per troy ounce</i> )	422.0	451.0	483.0	517.0	553.0	591.0	633.0
Arms sales ( <i>billion US \$</i> )	5.1	5.4	5.8	6.2	6.6	7.1	7.6
Grain production ( <i>million tons</i> )	211.5	215.0	216.6	218.2	219.8	221.4	223.0

Note: This table shows the assumed values for the key input variables in the SOVSIM model of the Soviet economy. Along with the equations in the model, these variables are the basis for the estimates presented in later tables.



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**Table 2**  
**New Fixed Investment: Percent Distribution**

	1984	1985	1986	1987	1988	1989	1990
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Industry</b>	39.3	40.4	41.6	42.7	43.9	45.0	46.2
Industrial materials	8.4	8.4	8.4	8.4	8.4	8.4	8.4
Oil	7.1	7.6	8.7	9.8	10.9	12.0	13.1
Gas	3.6	4.3	4.3	4.3	4.4	4.4	4.4
Coal	1.7	1.7	1.7	1.8	1.8	1.9	1.9
Electric power	3.2	3.2	3.3	3.3	3.4	3.4	3.5
Machine building and metalworking	9.4	9.5	9.6	9.7	9.8	9.9	10.0
Chemicals	2.3	2.2	2.1	2.1	2.0	2.0	1.9
Consumer goods	3.5	3.5	3.4	3.3	3.2	3.1	3.0
<b>Construction</b>	3.8	3.7	3.6	3.5	3.5	3.4	3.3
<b>Agriculture</b>	19.2	19.0	18.9	18.8	18.7	18.6	18.5
<b>Transportation and communications</b>	12.0	12.0	11.6	11.2	10.8	10.4	10.0
<b>Trade and services</b>	12.9	12.5	12.3	12.1	11.9	11.7	11.5
<b>Housing</b>	12.7	12.4	12.0	11.6	11.3	10.9	10.5

Note: This table shows the investment distribution assumed for the baseline case.



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**Table 3**  
**Sources of GNP (Factor Cost)**

*Billion 1970 rubles*

	1984	1985	1986	1987	1988	1989	1990
GNP	578.0	590.1	598.9	608.3	618.1	628.6	639.3
Total industry	210.2	215.2	219.0	223.3	228.1	233.2	238.4
Industrial materials	48.3	49.2	49.9	50.7	51.5	52.4	53.3
Oil	9.5	9.6	9.4	9.3	9.1	9.0	8.8
Gas	3.5	3.7	3.8	4.0	4.2	4.3	4.5
Coal	6.2	6.2	6.2	6.3	6.4	6.4	6.5
Electric power	16.7	17.1	17.8	18.4	19.2	20.0	20.8
Machine building and metalworking	82.1	84.9	87.1	89.6	92.4	95.3	98.3
Chemicals	15.1	15.2	15.3	15.4	15.5	15.7	15.8
Consumer goods	28.9	29.2	29.4	29.6	29.9	30.1	30.4
Construction	44.0	44.6	44.9	45.2	45.6	46.1	46.5
Agriculture	87.3	90.0	91.7	93.4	94.9	96.4	98.0
Transportation and communications	66.5	68.0	68.7	69.6	70.7	71.9	73.2
Trade and services	159.9	162.4	164.6	166.7	168.8	170.9	173.0
Military personnel	8.3	8.4	8.4	8.3	8.4	8.4	8.4
Residual	1.6	1.6	1.6	1.7	1.7	1.7	1.8

Note: This table presents the key SOVSIM production estimates. Because weather conditions cannot be predicted, agricultural production for 1984 and following years reflects crop yields estimated on the basis of trend lines. The measure of agriculture is adjusted for both intra-agricultural use of farm products and purchases by agriculture from other sectors.



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**Table 4**  
**Average Annual Growth of GNP (Factor Cost)**  
**by Five-Year Plan Period**

*Percent*

	1966-70	1971-75	1976-80	1981-85	1986-90
GNP	5.3	3.7	2.7	2.4	1.6
Total industry	6.3	5.9	3.2	2.3	2.1
Industrial materials	5.0	4.4	1.2	1.6	1.6
Oil	7.8	6.8	4.2	0.6	-1.6
Gas	9.2	7.9	8.5	6.3	4.1
Coal	1.6	2.3	NEGL	0.5	0.8
Electric power	7.9	7.0	4.5	3.3	4.0
Machine building and metalworking	6.9	8.0	5.0	3.3	3.0
Chemicals	8.9	8.6	3.6	1.7	0.7
Consumer goods	6.4	3.4	1.8	1.2	0.8
Construction	5.8	5.6	2.3	1.6	0.9
Agriculture	3.5	-2.3	0.5	4.0	1.7
Transportation and communications	6.9	6.6	3.7	2.3	1.5
Trade and services	4.9	3.7	2.8	2.0	1.3

Note: This table translates the production estimates of table 3 into average annual growth rates for 1981-85 and 1986-90. Although these growth rates are more representative of trends than individual annual growth rates are, they are very sensitive to the base years. Thus, the growth rate for GNP in 1981-85 will somewhat overstate the trend because poor weather in 1980 affected agriculture adversely, resulting in a below-trend GNP for that year.



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**Table 5**  
**Uses of GNP (Factor Cost)**

*Billion 1970 rubles*

	1984	1985	1986	1987	1988	1989	1990
GNP	578.0	590.1	598.9	608.3	618.1	628.6	639.3
Consumption	298.6	305.0	310.1	314.5	319.2	323.6	328.5
Investment	174.1	179.5	182.7	186.7	191.1	196.1	201.4
New fixed investment	139.7	143.9	146.5	149.6	153.1	157.2	161.4
Defense	79.7	81.3	82.9	84.6	86.3	88.0	89.8
Government administration	15.7	15.9	16.1	16.2	16.4	16.6	16.8
Government research and development	0.9	0.8	0.8	0.7	0.7	0.7	0.6

Note: SOVSIM estimates consumption as the residual end use after subtracting investment and defense and other government expenditures from GNP. Investment is estimated as the residual in an investment goods balance that takes into account production of investment goods and such claims on this production as consumer durable goods and military procurement of machinery (including weapons). Because of data constraints, SOVSIM must work with two measures of new fixed investment: (1) a factor cost measure

that fits in with SOVA's reconstruction of Soviet GNP and (2) the official Soviet measure, which is used in tracing investment flows to producing sectors and housing. This table presents estimates of the factor cost measure. Defense is an assumed variable, while the estimates for government administration and research and development are based on assumed shares of GNP. The uses of GNP shown do not sum to the total shown because there is a small residual that includes net exports and inventory change.



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**Table 6**  
**Average Annual Growth of GNP Uses (Factor Cost)**  
**by Five-Year Plan Period**

Percent

	1966-70	1971-75	1976-80	1981-85	1986-90
GNP	5.3	3.7	2.7	2.4	1.6
Consumption	5.3	3.5	2.8	2.0	1.5
Per capita consumption	4.3	2.6	1.9	1.1	0.8
Investment	6.1	5.7	4.3	3.2	2.3
New fixed investment	6.7	5.0	3.8	3.2	2.3
Defense	4.7	4.4	2.7	2.2	2.0
Government administration and research and development	8.2	3.3	1.4	1.1	0.7

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**Table 7**  
**New Fixed Investment**

Billion 1973 rubles

	1984	1985	1986	1987	1988	1989	1990
<b>Total</b>	<b>147.2</b>	<b>151.8</b>	<b>154.7</b>	<b>158.2</b>	<b>162.1</b>	<b>166.4</b>	<b>171.0</b>
Industry	57.8	61.3	64.3	67.6	71.1	75.0	79.0
Industrial materials	12.4	12.8	13.0	13.3	13.6	14.0	14.4
Oil	10.5	11.5	13.5	15.5	17.7	20.0	22.4
Gas	5.3	6.5	6.7	6.9	7.1	7.3	7.5
Coal	2.5	2.6	2.7	2.8	2.9	3.1	3.2
Electric power	4.7	4.9	5.0	5.3	5.5	5.7	6.0
Machine building and metalworking	13.8	14.4	14.9	15.3	15.9	16.5	17.1
Chemicals	3.5	3.3	3.3	3.3	3.3	3.3	3.2
Consumer goods	5.2	5.3	5.3	5.2	5.2	5.2	5.1
Construction	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Agriculture	28.3	28.8	29.2	29.7	30.3	31.0	31.6
Transportation and communications	17.7	18.2	17.9	17.7	17.5	17.3	17.1
Trade and services	19.0	19.0	19.0	19.1	19.3	19.5	19.7
Housing	18.7	18.8	18.6	18.4	18.2	18.1	18.0

Note: The estimates of total new fixed investment are for the official Soviet concept of such investment. The estimated flows of investment goods to producing sectors and housing depend directly on this total, which is calculated in the model, and the allocation pattern assumed in table 2.

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**Table 8**  
**Hard Currency Import Capacity**

*Billion US \$*  
(except where noted)

	1984	1985	1986	1987	1988	1989	1990
Import capacity	32.1	35.0	38.2	41.7	45.5	49.7	54.2
Total exports	24.9	28.8	32.5	34.3	35.9	37.6	39.2
Nonfuel exports	8.1	8.7	9.5	10.2	11.0	12.0	12.9
Oil exports	11.4	11.4	11.3	10.9	10.8	10.5	10.0
Price (US \$ per barrel)	31.0	33.2	35.5	38.0	40.7	43.5	46.6
Volume (million b/d)	1.0	0.9	0.9	0.8	0.7	0.7	0.6
Gas exports	5.2	8.4	11.5	12.7	13.7	14.8	15.8
Price (US \$ per barrel oil equivalent)	28.0	33.0	35.3	37.8	40.4	43.2	46.3
Volume (million b/d oil equivalent)	0.5	0.7	0.9	0.9	0.9	0.9	0.9
Arms sales	5.1	5.4	5.8	6.2	6.6	7.1	7.6
Gold sales	4.2	4.4	4.9	5.2	5.5	5.9	6.3
Price (US \$ per troy ounce)	422.0	451.0	483.0	517.0	553.0	591.0	633.0
Volume (tons)	312.4	306.5	312.9	310.9	308.1	310.1	309.8
Credits	6.6	6.4	5.8	7.4	9.6	12.9	17.4
Debt service	6.8	8.0	8.7	9.1	9.9	11.6	13.9
Unrecorded expenditures	3.7	4.0	4.3	4.6	4.9	5.3	5.6

Note: Import capacity is defined as the level of imports that could be afforded, given earnings, credits, and debt service. The order of the line items follows the SOVSIM calculations: import capacity equals exports plus arms and gold sales plus credit drawings plus miscellaneous other net earnings (not shown), less debt service and assumed unrecorded expenditures.

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**Table 9**  
**Hard Currency Balance of Payments**

Billion US \$

	1984	1985	1986	1987	1988	1989	1990
Trade balance	-7.1	-6.2	-5.7	-7.4	-9.6	-12.1	-15.0
Exports	24.9	28.8	32.5	34.3	35.9	37.6	39.2
Imports	32.1	35.0	38.2	41.7	45.5	49.7	54.2
Gold sales	4.2	4.4	4.9	5.2	5.5	5.9	6.3
Net interest earned	-1.6	-2.1	-2.3	-2.4	-2.6	-3.2	-4.1
Other earnings	6.4	6.9	7.5	8.1	8.8	9.5	10.3
Current account balance	2.0	3.0	4.4	3.5	2.1	0.1	-2.5
Net borrowing	2.5	1.8	0.8	2.0	3.8	6.1	9.2
Net change in assets	0.7	0.8	0.8	0.9	1.0	1.0	1.1
Capital account balance	1.8	1.0	-0.1	1.1	2.8	5.1	8.1
Unrecorded expenditures	3.7	4.0	4.3	4.6	4.9	5.3	5.6

Note: These estimates are projected from historical base years of 1981 or 1982. Therefore, the projections shown here and in table 10 for 1984 and 1985 in particular do not capture the recent improvement in Soviet foreign trade. However, the differences do not substantially change the longer term trends depicted here.

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**Table 10**  
**Soviet Debt to Western Nations**

Billion US \$  
(except where noted)

	1984	1985	1986	1987	1988	1989	1990
Credit drawings	6.6	6.4	5.8	7.4	9.6	12.9	17.4
Debt service	6.8	8.0	8.7	9.1	9.9	11.6	13.9
Repayments	4.1	4.6	5.1	5.3	5.9	6.8	8.2
Interest	2.7	3.4	3.6	3.8	4.1	4.8	5.8
Amount available to offset trade deficit	-0.2	-1.6	-2.9	-1.8	-0.3	1.3	3.4
Gross debt (end of year)	26.3	28.1	28.8	30.8	34.6	40.8	50.0
Assets (end of year)	11.2	12.0	12.9	13.8	14.7	15.8	16.9
Net debt (end of year)	15.1	16.1	16.0	17.1	19.9	25.0	33.1
Total hard currency earnings	34.1	38.0	42.6	45.2	47.6	49.8	51.7
Debt service ratio (percent)	19.9	20.7	20.2	20.0	20.7	22.9	26.3

Note: The debt service ratio is calculated as repayments plus interest over the sum of exports, gold sales, and arms sales (table 8).

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